
Software Licensing Models Amid Market Turbulence

Practice

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SUMMARY

Paying a maintenance fee for licensed software is one way of getting corrective, perfective and adaptive maintenance done, in whole or in part. This paper reports on the experience of Cadence Design Systems, Inc. in modifying its software licensing fees. The paper gives background on Cadence, and reviews the historical development of the software licensing maintenance fee. The paper then summarizes the current pressures for changes in licensing practices and maintenance fees to fit customer needs better, and describes the experience Cadence has had with the changes it adopted. The paper closes with four lessons learned relevant to software maintenance. © 1997 John Wiley & Sons, Ltd.

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1. ALL SOFTWARE TOOL USERS AFFECTED

The economic turbulence caused by technology and globalization has left no industry untouched. It has affected all software users. All aspects of a firm's marketing strategy, including pricing, product and distribution objectives, are now routinely revised. A specific case in point is the changes thrust upon licensing as a method of distributing software tools and providing maintenance of them. Specifically, increased competitiveness has compelled companies throughout the software sector to scratch old licensing models in favour of approaches that respond to today's customer needs in today's turbulent markets (Yacco, 1992; Ouellette, 1997). The experience of Cadence Design Systems offers a case study illustrating both the challenges and the opportunities in this new environment from the point of view of software maintenance.

A user of a system implemented in part with software—as for example, an electronic design automation ('EDA') system—has the classic 'do' or 'buy' choices for keeping the

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system maintained. These choices may apply differently to corrective, perfective, and adaptive maintenance. Some software vendors, such as Cadence, have offered to do some or all of the software maintenance for the software user in exchange for either a contract payment or a maintenance fee.

2. CASE STUDY BACKGROUND

Cadence is the leading purveyor of software tools used by engineers in the design of complex electronics. Its software tools enjoy a dominant market position in several areas, including Integrated Circuit Design and Logic Simulation. While many of its competitors specialize in a specific niche of EDA, Cadence is the only company offering tools covering a broad spectrum of critical technologies that can serve the entire electronics design marketplace. Cadence has customers world-wide in virtually all market segments of the electronics markets, including semiconductor manufacturing, data processing, telecommunications, consumer products, automotive, aerospace and the military. Some of the products designed with Cadence involvement are Sun Microsystem's SparcStation 10, Motorola's Bravo Pagers, Hitachi's transportable video conference system, and the Apple Power Macintosh. The New York Stock Exchange listed firm has passed one time industry giants Mentor Graphics, Daisy Systems and Valid Logic Systems, and in 1996 reported revenues in excess of \$700 million. Its market capitalization is in excess of \$3 billion, reflecting the usefulness of its software tools in the design of complex electronics.

As the dominant player in the EDA industry, Cadence was not thrilled a few years ago to learn that its traditional, money-making licensing model was beginning to lose value for the customer. Typically, a customer was asked to purchase a software licence that provided a 99-year right-of-use. In a relatively static world, where tomorrow could be expected to look much like today, the payoff or leverage to the customer from such terms of original acquisition could be expected to be substantial. However, in a more volatile rapidly changing environment, the kind that has developed in the turbulence of the past decade, the promise of a 99-year-use loses appeal, even when accompanied with a constant stream of software updates improving functionality.

That was only part of the problem. The licensing formula used by Cadence was part and parcel of a broader business model that was no longer attractive from a profit perspective. The company had amassed an impressive war chest of design expertise in its applications engineering (AE) ranks. These were the legions of field engineers who worked with customers to install their Cadence software and help them become proficient with it. Their services had been traditionally covered under an antiquated pricing system that included a maintenance contract customers signed when they purchased Cadence tools. Yet, upon closer examination, the AEs were often going far beyond the call of duty in supporting their customers—sometimes even doing the actual design work with them.

Customer satisfaction surveys supported hunches by Cadence's executive team: customers repeatedly indicated that they enjoyed and found value in the local AE and other support as much as the software. Some customers reported that what they liked most about Cadence was their local AE participation, not the tools themselves. Cadence was not only in the software tools business, it was also becoming a consulting firm. The

problem, of course, was that its strategic thrust and expected revenue stream were based on the assumption that it was still the software, the basic product, and not the combination of software and consulting, the total product, that customers were interested in buying.

In effect, the company was faced with two potentially lethal challenges, simultaneously. Primarily, Cadence's continued prosperity depended on meeting the customer's needs for a new and different purchase and licensing program. Secondly, the firm needed a way to earn income from all the expertise—the intellectual and technical firepower—that it was spending on customers long after a software purchase had been completed.

3. OLD LICENSING MODELS AND CUSTOMERS' NEW REQUIREMENTS

3.1. Tiered licence pricing

The licence model for EDA software had evolved from the models used by other software tools providers for use on centralized computer facilities, such as for compilers, for test generators and for generalized application software. The original major trigger was the 1969 IBM unbundling of software, so that the explicit pricing of software licences became common practice (Phister, 1979, pp. 24–27). The maintenance costs and licence prices in turn appear to have been based historically, largely on vendor cost experience with computer hardware maintenance (Phister, 1979, pp. 230–236), or upon the cost of the original development of the software (Sharpe, 1969, pp. 517–526).

By the 1980s, tiered pricing had become the dominant model for software pricing, which usually took one of two forms. In one, the users paid a fixed initial price to start the licence, and thereafter a monthly or annual maintenance fee, usually between 5% and 10% annually of the initial fee, to renew the licence and receive support (Korzeniowski, 1994). In the other, the users paid a fixed initial fee for a specified term of use, and thereafter a monthly or annual maintenance fee, usually between 5% and 10% annually of the initial fee, to receive support. In both cases, the support usually included bug-fixes (corrections) and upgrades (new versions incorporating perfective and adaptive modifications). Where a modest or no maintenance fee was demanded, bug fixes were selectively made available free as installable patches, and upgrades were charged for separately on a when-provided basis. For some software, the maintenance fee included installing the upgraded or corrected software for the user; for most, the maintenance fee paid only for providing the upgraded or corrected software but leaving it to the user to install it (or not).

Since the early 1990s the prevailing software licensing model has been a 99-year or perpetual right-to-use licence for a software product, sold to a user or organization (Culpepper and Associates, 1995, p. 5–15). The EDA industry adopted this pattern about a decade earlier. The software 'unit' that is priced and licensed may vary slightly among different vendors in different industries (Culpepper and Associates, 1995, pp. 4–10 to 4–18). Some software is licensed for use by a particular user; such is as the case with most word processor products. Some client–server (C/S) applications that operate on a network of computers, such as a calendar manager, might be priced on the number of PCs having

access to the master calendar facility. Still other software might be licensed based on the amount of concurrent usage, or on the total hours of use at the site. Other considerations or limitations might also apply, including items that are specific to a firm or industry (for example, language, translation and geographic constraints), or restrictions on usage (such as a monthly limit or on a specified hardware platform) and on transferability of the licence within or outside of the organization (Korzeniowski, 1994). For the most part, however, organizations buy software licences in a transaction orientated approach, as they would any other object or service, including the terms of payment. That is, customers make their payments and receive their CD-ROMs or diskettes of the computer software.

In addition to the software, most software companies also offer some form of maintenance, service or warranty contract (Culpepper and Associates, 1995, p. 6–13). Essentially, the software licence is the first product sold. Then, sometimes, the maintenance becomes a marketable product and a source of revenue as well (Jones, 1994; Bernstein and Lenowitz, 1995). Within this economic incentive, the purpose of maintenance is to help the user continue to employ the software effectively, sometimes even in the face of changing requirements. Maintenance can be packaged and sold in any number of creative ways. These can include various combinations of specifications regarding the type of maintenance, schedules, deliverables and scope of work.

3.2. EDA concurrent licence pricing

Electronic products are often designed by teams of engineers over the course of six to 24 months. During the design cycle, design personnel will call upon the power of many different EDA tools to ensure that their product is properly designed and analysed to meet product specifications. EDA software tools operate in engineering work-group environments that are widely networked with high performance Unix workstations, such as those available from Sun Microsystems and Hewlett-Packard. In this environment of teams and network resource sharing, it is no surprise that EDA software tools are licensed as a shareable resource in what is referred to as a 'floating' or 'concurrent' licence. In this model, the customer will buy ' N ' number of copies of the licences. Up to any ' N ' number of that customer's users on a local network may then use those licensed copies of the software, but no more than ' N ' copies may be in use at any one time. If the customer needs ' $N + 1$ ' copies, then the customer must purchase another licence. Because customers tend to regard EDA software licences as expensive, many customers try to avoid buying more software than necessary and tend to manage their software around maximizing its 24-hour use.

The maintenance model for EDA software evolved from the maintenance model generally used by computer hardware manufacturers. In the early days of EDA in the 1980s, most EDA suppliers sold hardware and software as a turnkey solution. In the hardware world, users purchase the hardware and then additionally purchase a support or maintenance contract to ensure continued operation of the hardware (Sun, 1997, pp. 2-1–2-27). The maintenance was intended to keep the hardware and software combination operating in case of defects in either the software or hardware. Most EDA suppliers offered some combination of hardware support, application engineer technical assistance, and application updates. The aggregate maintenance fee was typically from 12% to 18% of the original

turnkey purchase price per year. As the workstations became more general purpose computing platforms, EDA suppliers stopped selling the hardware. In this migration, the EDA vendors continued to charge, almost without much forethought, the maintenance fee of 12% to 18% per year of the original software licence purchase price for the maintenance of the software. Maintenance usually included telephone help-desk support, patches for bug-fixes (corrections), a stream of state-of-the-art updates (perfective and adaptive modifications) to the software, and some on-site AE support (where available), all with some vendor-to-vendor variations.

3.3. Pricing model begins to break down

For Cadence, the model began breaking down on all fronts as Cadence's customers faced new and intense business challenges. Electronic designs had become more complex and 'siliconization' had become more common. The trend towards competing on the basis of speed, quality and innovation had accelerated through various sectors of the economy—from semiconductors to automobiles, from industrial firms to those in consumer electronics. EDA software had become a more critical component of the work process, but the selling formula for the software had stayed the same. Cadence customers let their dissatisfaction be known.

Complaints were sometimes paradoxical: in one report, customers said that they paid too much for maintenance at 12% to 18% annually of the initial fee, even though, in a separate study, customers claimed that software value decreased at a rate of 40% annually without maintenance. Customers also expected their annual maintenance fee to cover the advancements required for Cadence to deliver technology sufficient to solve a next-generation design challenge. Yet, if Cadence did not deliver the technology, the same customers were willing to purchase the technology from a Cadence competitor at full list price. Some customers claimed the software was not powerful, flexible and leading-edge enough, yet others complained the same software was too hard-to-use with too many options, or too flexible.

Still other customers complained that the EDA industry licensing policies were not user friendly and were out of touch with modern corporate and design practices (Goering, 1994, 1995). For example, some of Cadence's customers develop their products with development teams distributed on a world-wide basis. For such firms the one mile floating radius on concurrent licence usage is an impractical alternative, one that ignores the globalization of business processes. Other customers claimed that they often did not have enough licences for particular EDA tools at critical times in their design project. This might occur if they miscalculated a particular task or did not purchase the correct tool—events that are increasingly likely to occur in a speeded-up business environment. Here the firms could not afford the time required to issue a purchase requisition in order to receive needed EDA software in a timely fashion—i.e., a sense of urgency had become part of the buying formula. Some users could not afford the purchase model for EDA software that might require an up-front investment of millions of dollars.

Cadence customers also gave specific illustrations of their needs over the course of an elaborate in-depth interview programme established by the company. The increasing competitive pressure and commoditization in most electronic markets demanded that

products be lower cost, higher functionality, higher quality, and have a shorter market life than ever before. Examples are cellular telephones, consumer video cameras, and consumer stereo equipment. In some cases, companies were forced by market competition into incorporating electronics into their product for the first time. Market windows of opportunity required reducing 24-month design cycles to six months. A week delay in schedule could cost millions of dollars in revenue. The migration of the electronic design challenge from industry-centred and business-centred products to consumer-centred products was affecting all players in the vast technology sector.

In a fast moving world of complex designs, these problems for mission critical components of product design could do irreparable damage if left unsolved. Subsequently, customers also began demanding new licence models (Goering, 1995). They began asking for licensing elements such as: world-wide use of their licence, pay-per-use licensing, software usage metering, and shrink-wrap software with pay-per-help-call support models.

Amid this turmoil it was also becoming clear that other victims of the outdated business and licensing models were the EDA companies themselves. Companies were going out of business on a fairly predictable cycle—as soon as the market was saturated with the first generation product, and when the market expected the second generation product to be delivered as part of the maintenance agreement. Even for companies that were surviving with fairly decent profit records, the loss of ground was becoming ugly. Cadence, for example, noticed that while its sales were growing at 9% per year, its number of customers was growing at 30 to 40% per year. Clearly, the pressure to match the revenue robustness of the stars of the semiconductor industry would soon materialize among shareholders of firms in the EDA industry.

In short, EDA vendors were selling software tools when it became obvious that electronics companies were not interested in tools—they were interested in meeting business objectives by delivering their products to market in an effective and timely fashion. To help these customers, Cadence realized it would need to remove artificial barriers to customer success. The problems that had challenged customers had shifted their positions; the solution offered by the EDA industry would have to as well.

3.4. The Cadence response: flexible access model

To help customers, Cadence realized its focus had to be much more directly aligned to or congruent with the customers' business objectives than ever before. There had to be a convergence of the business models and software licensing practices. Simply 'pushing' tools was not enough. It became necessary to partner with companies in the design of chips. A distant customer-supplier model was no longer adequate for companies designing electronic components for fast moving markets. The ambition in the words of Joe Costello, Cadence CEO, became not only to 'sell spreadsheets, but also the accountants and financial analysts that go with them'. As its own business objective became better understood (both inside and outside the firm), Cadence learned that it could customize both the combination of the software licence agreement and the delivery of in-house design expertise to offer a solution of greater value, greatly enhancing the probability of success for both itself and its customer. Depending upon customer requirements, Cadence could draw upon its resources for a diversity of tasks such as:

- optimizing tool flow,
- configuring tools for optimal performance,
- providing expert tool assistance,
- participating as a design team member, or
- serving as an outsource vendor (from idea to 'working silicon').

A combination of these activities helped one major semiconductor manufacturer improve processes so that custom chips could be delivered in seven days, versus the previous 30 days.

The extent to which Cadence used its creativity in pulling together the sales and delivery dimensions of the customer relationship were unprecedented in the industry. One customer, for example, pays with royalties on its own chip sales. Another customer has its Cadence fees move upward with the success of its microprocessor sales. In other words, there is more than a sale of a licence to use some software tool product that is taking place: Cadence is willing to share risk with the customer. Indeed, there have been situations where Cadence, recognizing the criticality of the timely delivery and functionality of a chip to a customer's overall strategy and market position, has actually guaranteed results, in schedule or performance, with stiff penalties for failure. Experience with the new business model—getting revenue from service as well as from tool sales of software licences—fostered the formalizing of a licensing model that fit with it, the 'Flexible Access Model'.

Cadence developed the Flexible Access Model out of a trial-and-error approach in working with customers. The Flexible Access Model is really a methodology that allows Cadence to tune software access for each customer based upon their business objectives, individual design needs, potential software use and financial considerations. With the Flexible Access Model there is an important mental shift in how licensing is approached. The focus of a licence alters from selling the right to use a unit of software, to maximizing the unit's contribution to a user's productivity. Clearly, software must be delivered, but the real key to success is the focus on the user and user's task.

The Flexible Access Model makes two important breaks overall from the traditional EDA licence models. One lies in an important trade-off: customers are willing to gain flexibility in software access, improvements to productivity and financial predictability in exchange for shortening the duration of the licence agreement (from 99 years to a three to five year duration). Another difference is that the maintenance model is changed, with the fee for maintenance services effectively amortized over the licence duration. The customer's right to receive software updates (perfective and adaptive modifications), bug fixes (corrections), and help-desk support is now negotiated as part of the initial licence and not treated as dependent upon or paid for directly through the maintenance fee. Other services are priced according to the customers' specific service needs. For example, application engineering (AE) design support, or special design assistance, is priced and contracted separately. A comparison of the Flexible Access Model and traditional EDA models is displayed in Table 1.

This approach has been well accepted by the customers who have adopted the new model. Design tools are typically purchased for projects with a six to 24-month focus, where disruption to work flow must be minimized, and users are often willing to re-

Table 1. Comparison of licensing models

Comparison item	EDA software licensing model	
	Traditional concurrent	New flexible access
General features and terms		
Licence duration	Perpetual or 99-year	three-year to five-year
Relationship	Customer/vendor	Business 'partner'
Business emphasis	Minimize cost	Maximize predictability
Trade-in rights	None	Users can 'reprofile'
Financial emphasis	Capital budget	Current expense budget
Payment terms	Net 30 days	Amortized payments/terms
Payment basis	List price	Annual payment amounts
Software unit licensed	Per shareable tool	Per user: per solution, per time period, with fixed prices for additional users
Geographic restrictions	Usage within one mile	Can be worldwide usage
Maintenance features and terms		
Usual maintenance goal	Maximize usage	Enhance user productivity
Maintenance fee basis	Per unit licensed	Contract covering all users
Maintenance fee (monthly)	1% to 1 1/2% of initial fee	Depends on features
Updates from vendor	Included; no added fee	Depends on contract terms
Bug fixes from vendor	Included; no added fee	Depends on contract terms
Help-desk support	Included: no added fee	Depends on contract terms
Application engineer support	Limited free availability	Separately available
Handling peak demands	Purchase more licences	Usage peaks allowed free
Custom modification, help	Available for separate fee	Available for separate fee

invest at the start of each new major project, if necessary. These circumstances have widened the opportunity for a win-win situation with the customer and Cadence. Customers gain flexibility and success, and Cadence wins with multi-year financial commitments to receive the maintenance fee, plus the possibility of licence renewal every three to five years.

4. LESSONS LEARNED BY CADENCE

Cadence learned that The Flexible Access Model is not for every customer, but approximately 8% of Cadence's product revenue is now being realized with it, and the percentage is growing. As Cadence and its customers gain more experience, perhaps portions of the model will be turned into more standardized offerings.

Cadence learned one lesson early on: by removing the haggling typically involved in a transaction-orientated software licence purchase, the customer and Cadence can focus more easily on the issues important to a customer's success. The amount of the maintenance fee then fades as an issue between Cadence and the customer.

Cadence learned that the maintenance aspects of The Flexible Access Model foster partnering skills. With the emphasis on adaptability and co-operation during the maintenance period—call it a willingness to share risk—Cadence found it gained a strategic advantage. Through Cadence's allied programmes, customers can more easily integrate Cadence products and technologies with the customers' products and technologies. This opportunity to mix and match third party and proprietary tools enhances customer capabilities to meet design requirements. More than 90 companies have integrated their software tools with Cadence software.

Cadence learned that allowing design engineers to work at higher levels of abstraction early in the design, plays well with the both the licensing model and the broad business model within which it is nested. With the continued shift to top-down methodologies, each fosters a *sustainable* process of speedy response to provide a faster time to market for competitive advantage. The Flexible Access Model's handling of the maintenance fees supports that sustainable process.

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